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ABSTRACTS OF CONTRIBUTED PAPERS

ON THE COSMIC ORIGINS OF CARBON AND NITROGEN

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We analyze the behavior of N/O and C/O abundance ratios as a function of metallicity as gauged by O/H in large, extant Galactic and extragalactic H II region abundance samples. Numerical chemical evolution models are computed using published stellar yields implied by comparing analytical models to the observations. Our results suggest that carbon and nitrogen originate from separate production sites and are decoupled from one another. Massive stars ($M>8M_\odot$) dominate the production of carbon, while intermediate-mass stars between 4 and 8 solar masses, with a characteristic ejection delay time of 250 Myr after their formation, dominate nitrogen production. Carbon production is positively sensitive to metallicity through mass loss processes in massive stars and has a pseudo-secondary character. Nitrogen production in intermediate mass stars is primary at low metallicity, but clearly secondary (and perhaps tertiary) when $12+\log(O/H)>8.3$. The observed flat behavior of N/O versus O/H in metal-poor galaxies is explained by invoking low star formation rates which flatten the age-metallicity relation and thereby allow N/O to rise to observed levels at low metallicities. The observed scatter and distribution of data points for N/O challenge the popular idea that intermittent polluting by oxygen from massive stars is occurring following star bursts. The effect of inflow of gas into galactic systems on secondary production of nitrogen from carbon may introduce some scatter into N/O ratios at high metallicities.

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THE STARBURST–INTERSTELLAR MEDIUM INTERACTION IN NGC 1569 I. LOCATION AND NATURE OF HE II SOURCES USING *HUBBLE SPACE TELESCOPE WFPC2*[1]

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We present the detection of He II sources in the Im galaxy NGC 1569 from *HST WFPC2* imagery. Out of the fifteen detections, seven were Wolf–Rayet stars, five were stellar clusters with associated He II emission, and three were sources of unknown origin. The majority of sources are found centered around the super–star clusters and only one WR star and one cluster are outside this region. The detected Wolf–Rayet stars' colors and magnitudes are similar to Large Magellanic Cloud late–type WN stars. All clusters within the starburst show a dichotomy between the red and the WR stellar population, and this signifies that stochastic self–propagating star formation appears to be an important property of the recent starburst. Three unknown sources are thought to be nebular He II and are most likely associated with the hot star ionizing continuum of super star cluster A. Finally, we conclude that 32–70 WNL equivalent stars exist in NGC 1569.

Previous to this study, Wolf–Rayet stars in NGC 1569 were not detected using ground-based imagery, but were only indicated through longslit spectroscopy. This is the first time the exact locations of the Wolf–Rayet stars in this nearby, well–studied, "post-starburst" galaxy have been determined.

[1] Based on observations with the NASA/ESA *Hubble Space Telescope*, obtained at the Space Telescope Science Institute, which is operated by AURA, Inc., under NASA contract NAS5-26555.

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NEUTRAL MATERIAL IN PLANETARY NEBULAE ENVELOPES

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We use the technique of Dinerstein & Sneden (1988, ApJ, 335, L23) on the central stars of 44 planetary nebulae to search for neutral material. Examination of the Na I resonance absorption lines at 5889.95, 5895.92 ÅÅ, indicates the presence of neutral material in the outer envelopes of more than half the sample. We present a selection of these spectra in the region of the Na I lines and measurements of their equivalent widths. Analyses of absorption features from other low–ionization species, such as Ca II 3933.63, 3968.47 ÅÅ, are in progress.

SULFUR AND ARGON ABUNDANCES IN TYPE II PLANETARY NEBULAE

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Sulfur and argon abundance gradients for the Milky Way are presented based upon newly acquired spectrophotometry of Type II planetary nebulae (PN). These spectra extend from 3600 Å to 9600 Å allowing us to use the [S III] lines at 9069 Å and 9532 Å to improve upon earlier sulfur abundance estimates. Considering that a significant portion of sulfur in PN exists in the S(+2) ionization stage, this method should allow us to extrapolate more reliable total element abundances from ionic abundances. Given the progenitor mass and location of Type II PN (close to the Galactic disk), objects in this sample are free of nucleosynthetic self–contamination and thus their S and Ar abundances in particular are expected to reflect levels of these elements in the interstellar medium at the time of PN progenitor formation. Sulfur and argon abundances also provide important information for studying massive star yields of these two elements, as well as their distribution across the Milky Way disk.

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A NEW AMMONIA CLUMP TOWARD THE STAR FORMING REGION G34.26+0.15

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In this work we reanalyze VLA ammonia (2,2) and (3,3) observations toward the massive star forming region G34.26+0.15. We find at least one new ammonia clump with (2,2) and (3,3) ammonia emission toward the northwest, in addition to the main molecular structure previously reported, which is closely associated with water masers spots. We estimate for this new ammonia clump a rotational temperature of ∼54 K, a diameter of ∼0.15 pc (assuming a distance of 3.8 kpc) and a molecular mass of >1 $M_\odot$. This result suggests that in addition to the stars that excite the H II regions previously reported, there may be other young stars of low–mass in the region.

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NEBULA AROUND LUMINOUS BLUE VARIABLE CANDIDATE HD 168625

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Luminous Blue Variables (LBVs) are luminous (typically $-12 < M_{bol} < -8$) OB stars with sporadic mass ejections and high mass loss rates of order $10^{-4} M_\odot\ yr^{-1}$. The characteristic mass ejections are observed as spectrophotometric variations that exceed variations of other blue supergiants. LBVs are massive stars with an initial mass $> 25 M_\odot$ in a transitional phase lying between that of O and WR stars. The transition is expected to be short due to

the small number of LBVs known. Currently, there are 32 recognized LBVs in 9 galaxies.

Many LBVs are observed to have circumstellar nebulae with similar properties, suggesting a common mechanism for their evolution and formation. LBV type nebulae are evidence of past activity during which the candidates were not in the quiescent state observed presently. As such, the existence of an LBV type nebula surrounding HD 168625 implies that it is an LBV which underwent significant mass loss some time ago. We obtained images of the emission and reflection nebulae with the WFPC2 on the HST in the $H-\alpha$ and V continuum, respectively, as well as the dust emission from the nebula with ISO using an LW8 filter.

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LIST OF ABSTRACTS